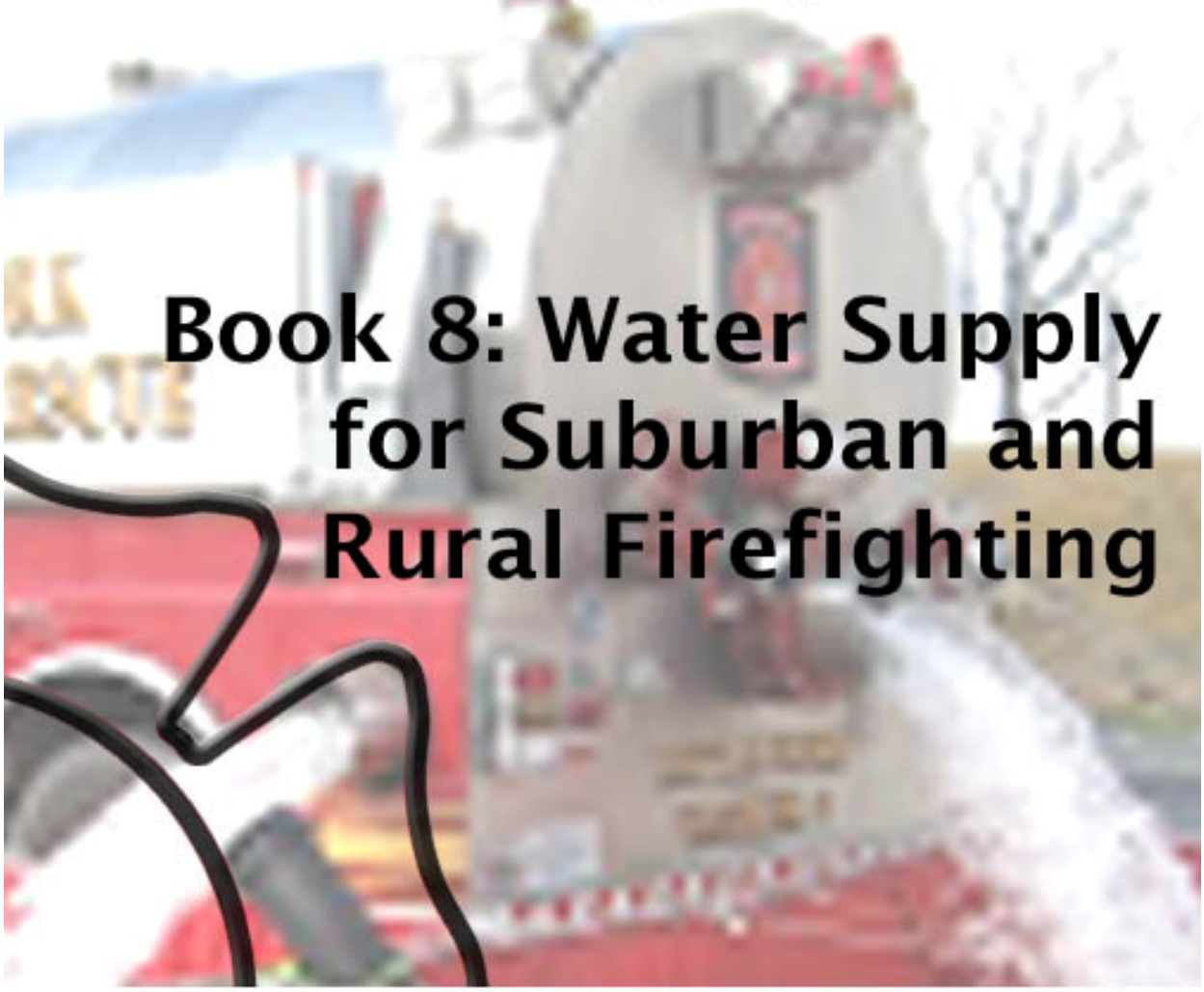
Emergency Operations Manual
Volume I - Firefighting Procedures



Book 8: Water Supply for Suburban and Rural Firefighting

Fire and Rescue Departments of Northern Virginia

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PREFACE

Every year in the Northern Virginia area, fires occur in rural and non-hydrant areas that account for significant fire losses. These fires typically occur where hydrants are in excess of 2,000 feet from the occupancy on fire.

Historically, in the more rural areas, the dwellings and occupancies were small homes or outbuildings that did not require significant fire flows to accomplish extinguishment. However, in recent years with the advent of lightweight construction and buildings with over 4,000 square feet of living space located in non-hydrant areas, water supply requirements have become critical. These incidents easily overwhelm the first-arriving companies and their ability to generate adequate water supplies.

This manual will discuss tanker operations in detail. It is important to note that tanker safety is critical to the success of the operation and, more importantly, the safety of firefighters, Figure 1. All too often, headlines appear in the news like: "Tanker Crash Kills 14-Year-Old and Mother", "Tanker Involved in Rollover Accident, Driver Trapped," and, "Firefighter Killed in Rollover of Tanker".

Chris Cavetter wrote the following for an article in Fire Chief magazine:

> "Tankers account for only a small portion of the apparatus operated by fire departments in the United States, yet they are involved in many of the accidents — a lot of them fatal. Here are 10 deadly mistakes that departments often make when specifying, building, operating and maintaining tankers.
>
> 1. Overloading the vehicle
> 2. Raising the center of gravity
> 3. Omitting the tank baffles
> 4. Cutting and splicing the frame
> 5. Not training drivers
> 6. Not limiting vehicle speed
> 7. Not wearing seatbelts
> 8. Not using ground guides when backing
> 9. Not following NFPA 1901
> 10. Not performing regular maintenance."

Figure 1 – Tanker accident.

> [The entire article can be viewed at http://firechief.com/apparatus/ten-tanker-mistakes/.]

Tanker safety must be a priority to all jurisdictions. When a tanker is responding by itself, a minimum of two personnel should be assigned to the unit when ever possible.

OVERVIEW

The purpose of this manual is:

- Reduce the potential life and property loss by developing an adequate water supply.
- Stress the importance to identify all rural/non-hydrant boxes by dispatch.
- Develop a standardized build-up of resources and tactics to combat fires in non-hydrant areas.
- Develop the appropriate Incident Command System (ICS) to successfully manage water supply operations in non-hydrant areas.
- Identify common terminology.
- Describe the equipment to be used for rural water supply operations
- Standardize the equipment to be used for all Tanker Companies.
- Develop standard deployment of operational units for fires in non-hydrant areas.
- Establish a Tanker Task Force response to be dispatched to all working fires in non-hydrant areas.
- Provide for a safe working environment for initial attack companies on these incidents.

COMMAND PROCEDURES FOR WATER SUPPLY

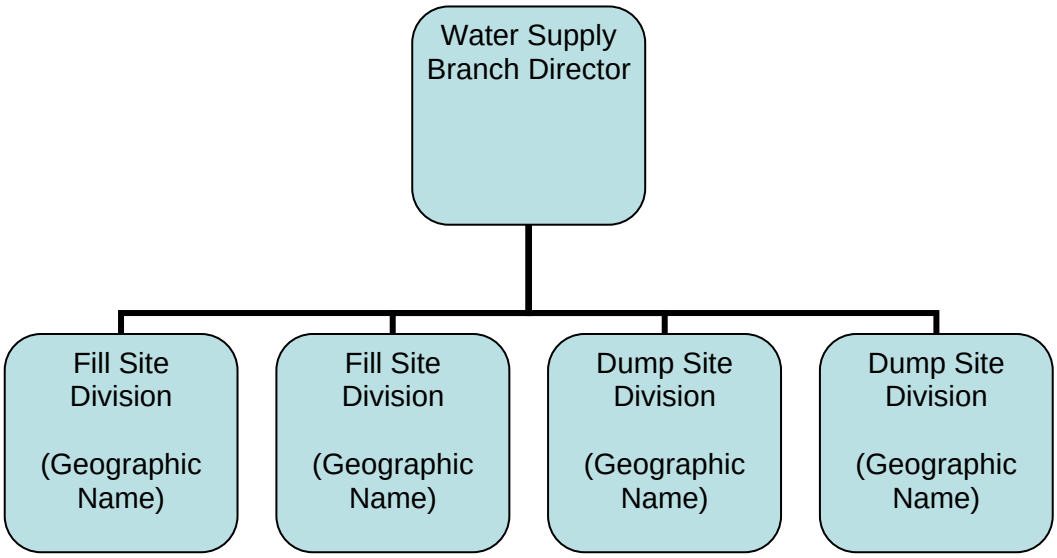


Figure 2 – Sample ICS chart for rural water supply operations.

Water Supply Branch Director

The roles and responsibilities of the Water Supply Branch Director include:

- Supervision of the Water Supply Branch, which is responsible for providing adequate water to the incident.

- Responsible for establishing and coordinating the fill sites, dump sites, shuttle routes and/or relay operations in both hydrant and non-hydrant areas.
- Determines with the incident commander the water supply needs of the incident.
- Keeps command appraised of the amount of water available upon request.
- Coordinate traffic control with law enforcement as required.
- Ensures tankers get priority at the fill and dump sites.
- Ensures adequate resources are available to support the water supply group.

Dump Site Division Supervisor

The roles and responsibilities of the Dump Site Division Supervisor include:

- Manages all activities at the dump site.
- Keeps WSBD apprised of the amount of water available upon request.
- Coordinate traffic control with law enforcement as required.
- Ensures that tankers get priority at the dump sites.
- Ensure units are dumped in the timeliest and safest manner possible.

Fill Site Division Supervisor

The roles and responsibilities of the Fill Site Division Supervisor include:

- Manages all activities at the fill site.
- Keeps WSBD apprised of the fill site conditions upon request.
- Coordinate traffic control with law enforcement as required.
- Ensures tankers get priority at the fill sites.
- Ensure units are filled in the timeliest and safest manner possible.

OPERATIONAL PROCEDURES

The following sections outline the procedures necessary for the successful operation of a dump site and a fill site.

Dump Site Operations – *Tankers have Priority at Dump Sites!*

- The dump site should be located near the end of the driveway leading to the structure unless otherwise noted in the preplan.
- Exact dump site layouts shall be determined by the terrain; ensure pits are not set up over ditches or on steep inclines.
- The engine company designated by the preplan should drop a Siamese at the dump site location and proceed to the incident typically laying supply line.
- Companies arriving on the scene need to support the water supply through the Siamese until the drafting pits can be set up for use by the supply engine.
- The first tanker either pulls past or stops short of the driveway to allow for the setting up of the dump pits. Tanker driver attaches a line to the supply Siamese and provides water for the first (attack) engine. Tanker driver drops all dump pits and sets up one to be used immediately. The hard sleeves with the low-level strainer will be left by the tanker driver at the dump site to allow the supply engine to readily hook up and begin water supply operations.

- Supply engine at the dump site sets up for a draft.
- Once a draft is established, the tanker will drop the remaining water into the drafting pit then proceed to fill site.
- If a draft cannot be established in three minutes or less, this unit shall be replaced by another engine company.
- The dump site engine driver will temporarily be in charge of dump site until relieved by the third engine officer.
- The Dump Site Division Supervisor needs to make sure ample amounts of pits are set up at the dump site.
- When two or more drafting pits are set up, use of the jet siphon system is recommended. This allows for better use of the water on hand and prevents equalizing of the drafting pits, which will bring the water below the minimum height for drafting.
- Tankers have the right-of-way in the dump site area; tankers will use their side and/or rear dumps.
- Engine companies involved in the shuttle operation will attach to 4-inch supply lines away from the dump site and pump their water off. This should leave ample room for tankers to move through the dump site area.
- The Dump Site Division Supervisor needs to be very cognizant of the fact that apparatus will be moving through the site. Safety of the personnel is paramount.
- Water is a very important resource! DO NOT WASTE WATER!
- Personnel at the dump site need to wear appropriate PPE, including traffic vests.
- Water supply or shuttling units may need to be staged and directed into the incident site as needed to keep the operation moving efficiently.

Fill Site Operations - *Tankers have Priority at the Fill Sites!*

- Typically, the fifth engine is responsible for setting up and maintaining the fill site; engine OIC will be the Fill Site Division Supervisor.
- The fill site should be chosen and established where the best flow of water can be achieved so that shuttle units can be filled as quickly as possible.
- *Tankers have priority at the fill sites*; they need to have a designated fill position that does not become encumbered by engines.
- The crew from the fill site engine needs to deploy enough lines to rapidly fill numerous incoming units.
- The fill site crew will connect and disconnect the fill lines as needed to facilitate a rapid turn around for units coming and departing the fill site.
- The Fill Site Division Supervisor needs to ensure apparatus moves efficiently through the fill site.
- The Fill Site Division Supervisor is responsible for site safety ensuring all personnel know their assignments.
- The WSBD needs to *STRONGLY* consider more than one fill site.
- Personnel at the fill area need to wear the appropriate PPE to include traffic vests and possibly PFDs.

GENERAL CONSIDERATIONS

Tanker and rural water supply (drafting) operations need to be practiced on a regular basis.

The ability to build up and support these incident operations need to be identified early, and additional resources need to be called for at that time.

Build-up and support for this operation is time consuming and calls for an extremely proactive approach by the initial Incident Commander (IC).

Units and personnel at the dump and fill site need to be very conservative in their water management. Water should not be wasted at the fill or dump site; it needs to be handled efficiently so it can be transferred to the attack engine for use on the fire ground.

Tanker Flow Calculations

The fire flow that can be obtained from a particular unit can be estimated using the following formula: Total Capacity of Tanker minus 20% divided by the round trip time.

> **Basic Example:** A Tanker with 2,500 gallons of water and a travel and fill time of 10 minutes will typically give us 200 gallons per minute fire flow on the fire ground:
>
> Capacity of 2,500 minus 20% (2,500 minus 500) = 2,000
>
> 2,000/10 = 200 gallons per minute.
> This is the estimated fire flow based on this calculation.

Fire Flow Formula. The NOVA region has adopted the National Fire Academy's Needed Fire Flow Formula for estimating the required fire flow for rapid fire control (1 to 2 minutes): Length x Width divided by 3 x # of floors + 25% for each exposure = needed fire flow.

> Example: 30' by 50' by two-story building, one floor with fire involvement and two exposures.
>
> 30 x 50 = 1,500 divided by 3 = 500,
> 1 floor involved 500 x 1 = 500, 2 exposures 250 GPM
>
> Total Fire Flow 750 GPM

TOOLS AND EQUIPMENT

This section will discuss recommended tools and equipment for water supply operations. Equipment may vary in style and manufacture depending on jurisdiction.

Figure 3 – Drafting pits.

Drafting Pits

Drafting pits are portable water tanks that can be set up to augment the water supply in a tanker shuttle operation, Figure 3.

Typical sizes of drafting pits:

- 1,500 Gallons 10’-3” x 10’-3” x 30”
- 2,100 Gallons 11’-3” x 11’-3” x 30”
- 2,500 Gallons 12’-3” x 12’-3” x 30”
- 3,000 Gallons 13’-3” x 13’-3” x 30”

Low-Level Suction Strainer

Low-level suction strainers are for use in drafting pits, Figure 4. They allow the engine company drafting to make the best use of all available water in a drafting pit down to a water level of approximately two inches.

Figure 4 – Low-level suction strainer.

Low-Profile Jet Siphon Strainer

Low-profile jet siphon strainers, Figure 5, allow engines the ability to get water from the dump tanks without having to draft. By charging the 1 ¾” hoseline, a continuous flow is established. This device can be used to transfer water from one pit to another.

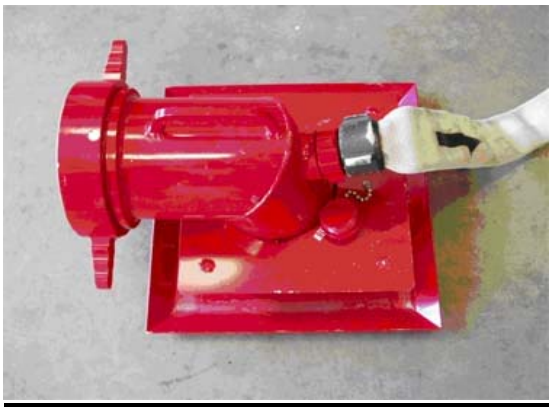


Figure 5 – Low-profile jet siphon strainer.

Supply Line Holder

Supply line holders allow personnel assigned to the dump site to set up fill lines for the pits using 4-inch hose, Figure 6. This holder will replace a firefighter typically needed to hold the line while it is discharging into the pit.

Sections of 4-inch hose are recommended to allow engines to connect and pump off water away from the draft site, which allow tankers easy access to the dumping pit.

Figure 6 – Supply line holder.

Jet Siphon

The jet siphon, Figure 7, is an auxiliary item that helps move water between drafting pits and helps with water conservation in the operation. By using a Venturi effect, the siphon moves 500 gpm between the tanks as needed.

Figure 7 – Jet siphon.

Clapper Valve

A clapper valve, Figure 8, prevents water from flowing back into the drafting pit once a draft is established. (*DO NOT USE WITH A FLOATING DOCK STRAINER*).

Figure 8 – Clapper valve.

Floating Dock Strainer

A floating dock strainer, Figure 9, allows engines or tankers to draft from a static water source. The strainer floats on the surface of the water and does not need additional equipment to keep it off the bottom of the water source.

Figure 9 – Floating dock strainer.

Gated Wyes/Siamese

(Set up for LDH and two 3” lines for use at fill sites)		
Gated Wye set up for LDH lines for use at dump sites when a LDH Siamese is not available		

LDH Siamese	

Minimum Equipment To Be Carried on Units

Equipment to be carried on all tankers:

- Drafting pits – one or two, total size must be at least capacity of tank
- Two 6" hard sleeves
- 6" low-level strainer
- 4" Siamese, manifold, or wye
- Siphon device to move water from one pit to another
- Floating dock strainer
- Supply line, size, and amount varies depending on unit
- Adapters 2 ½" to 4" (All 4" to be Storz connections)
- Adapters 5" to 6"
- Adapters 4 ½" to 6"
- Salvage covers for under pits
- Supply line holder – 4"
- Water Supply Officer bag[1]
- Water supply preplan book

Equipment to be carried on engines at tanker stations:

- Two 6" hard sleeves
- 6" floating dock strainer
- Supply line – minimum 1,000' LDH or 2,000' 3"
- Siphon device to move water from one pit to another
- Adapters – 5" to 6"
- Adapters – 4 ½" to 6" double female
- Adapters – 4 2 ½" male to 4" Storz
- Adapters – 4 2 ½" female to 4" Storz
- Water Supply Officer bag
- Water supply preplan book
- 4" Siamese, manifold or gated wye set up for 4" Storz connections for dump site

[1] The Water Supply Officer bag includes: NOVA quick reference guide, tanker capacity guide, tanker resource guide, water supply worksheets, one notepad, two stop watches, one handheld calculator, wWter Supply Branch Director vest, Fill Site Division vest, and Dump Site Division Vest.

- Two gated wyes or manifold set up for 4" to 2- 2 ½" connection for the fill site
- PFD's for staffing positions

Equipment to be carried on all engines:

- Two 6" Hard sleeves (strongly suggested)
- 6" Floating Dock Strainer (strongly suggested)
- Supply Line – minimum 1,000' LDH or 2,000' 3" (strongly suggested)
- 4" Siamese, manifold or gated wye set up for 4" Storz connections for dump site operations
- Adapters – four 2 ½" to 4"
- PFD's for staffing positions

Equipment to be carried on all command vehicles:

- Water Supply Officer bag
- Jurisdictions water supply preplans

RURAL WATER SUPPLY PREPLANNING

Preplanning areas where there are no hydrants is extremely important to allow operations to be initiated at the earliest possible moment. A comprehensive preplan needs to be developed.

Homes and other occupied structures in non-hydrant areas need to be identified and water supply preplan needs to be completed to ensure adequate water supply can be established.

It is recommended preplans for all non-hydrant areas be completed and sent to the first six engine companies and the tanker stations for inclusion in a rural water supply preplan book. (Ensure neighboring jurisdictions are included in this effort.)

A rural water supply preplan book shall be maintained by the tanker stations. New streets and preplans shall be added in the book as they become available.

WATER USAGE AGREEMENT

The Code of Virginia (1989) Title 27; Chapter 2; Fire Departments and Fire Companies: Section 27-20 has been interpreted as allowing fire departments and fire companies the right to acquire water from whatever source is available "to prevent the spread of fire."

It would be beneficial from a public relations perspective for the departments to have a water usage agreement with owner(s) of preplanned water sources. Therefore, every reasonable effort should be made to contact owners of privately owned water sources (with no public access). A Water Usage Agreement (Appendix B) should be filled out, signed by the respective parties and kept on file. This shall apply to both static and nonstatic sources.

FIRE OPERATIONS

A Tanker Task Force will be dispatched on all structure fire incidents in non-hydrant areas. If this is not done at dispatch through the communications center the task force should be added at the discretion of the initial engine company or the battalion chief.

A Tanker Task Force shall consist of the following units, in addition to the first-alarm assignment.

- Two engines
- Three tankers
- One battalion chief

If tankers are dispatched without engines, it is strongly recommended an additional firefighter is placed on the unit for a crew of two. This will increase the safety of the crew responding to the incident, as well as allow for greater efficiency when performing the tasks required on the scene or at the fill/dump site.

Size-Up and Situation Reports

The first-in company in a non-hydrant area must provide a good concise situation report to the balance of the assigned units coming to the scene. The first-arriving officer needs to do a very good risk benefit analysis to determine whether or not to commit to an offensive operation based on the visual cues available to them on arrival. Additionally, the OIC needs to base their tactics and fire flow requirements on the anticipated water supply.

Based on a risk benefit analysis, the first-in engine company officer must start to develop the appropriate organizational structure to manage the incident. This should be started early and needs to be correct for the incident at hand.

If there is a need to initiate interior offensive operations, it needs to be started as soon as feasible. (Consideration should be given to use CAFS, Class A foam solution or Class B foam lines to better use water. By using foam, crews can effectively extend firefighting operations by using less water.)

While en route to the fire, the first-arriving engine officer needs to begin to set up for water supply operations. With the appropriate pre-plan, the officer can designate fill sites, dump sites or relay positions that will allow in-coming units to take their pre-determined positions.

ROLES AND RESPONSIBILITIES

Shuttle Operation (Typically lays less then 1,000 feet)
(Includes a Tanker Task Force)

First Engine

- Upon dispatch of a working fire in a structure in a non-hydrant area, a Tanker Task Force should be added at the discretion of the initial engine company or the battalion chief.
- Lay out supply line from the driveway to the incident. This should be done from where the supply pumper and drafting pits are to be located (the dump site). This may require a split lay.
- Assign fifth engine to fill site operation duties and designate fill site location.
- The lay out from the first engine should include a Siamese on the supply line whenever possible.
- Advise incoming units of the mode of attack and supply line position according to the pre-plan.

First Tanker

- Pump water to first engine through the Siamese.
- Drop drafting pits, hard sleeves, flat suction strainer, and other ancillary devices for dump site operations. Drop an additional Siamese and hose for the dump site engine.
- Once a draft is established from the drafting pit by the dump site engine (normally the second engine), the tanker dumps its remaining water into drafting pits.
- Once the tanker is empty, this unit becomes part of the shuttle operation and proceeds to the fill site.

Second Engine (Typically Draft Engine)

- Officer on the second-arriving engine typically assumes command of the incident if it is transferred from the first engine.
- Engine driver sets up to supply water to the first engine from the dump site by hooking a line to the Siamese attached to the first engine's supply line.
- Second engine drops water into the drafting pit and establishes draft from its tank. Once draft is established, first tanker can then drop its remaining water and shuttle
- Second engine must leave room for additional drafting tanks to expand the water supply if needed.

Third Engine

- Officer and crew arrive on the scene and assume control of the dump site.
- Crew from engine sets up and staffs the dump site.
- Third engine officer assumes position as Dump Site Division Supervisor.
- Engine driver drops water into the dump tank or sets up to flow water to the second engine via the Siamese. After off-loading water, the unit proceeds to the designated fill site.
- The DSDS will head up water supply operations until the second Battalion Chief establishes the Water Supply Branch. Once the Water Supply Branch is established, the DSDS will only be responsible for dump site operations.
- Engine becomes part of the shuttle operation.

Fourth Engine

- Officer and two firefighters proceed to the incident scene and becomes the RIT.
- Driver drops water at the dump site and proceeds to the designated fill site.
- Engine becomes part of the shuttle operation.

Fifth Engine (Fill-Site Engine)

- The fifth engine dispatched on the incident will most likely be directed to respond to the fill site location with the crew to begin fill site operations.
- At least two lines will come from the engine to facilitate the rapid filling of units coming to the fill site. (Tankers have priority and should have a designated fill position.)
- The officer will become the Fill Site Division Supervisor and will be under the direction of the Water Supply Branch Director.

Sixth Engine

- Assists shuttling water.

First Truck

- Position truck as close to the fire scene as possible for access by crew and equipment.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
- Consideration should be given to use of adjacent driveways.

First Rescue

- Position as close to the incident scene as possible for access by crew and equipment.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
- Consideration should be given to use of adjacent driveways.

Second and Third Tanker

- Arrives on scene at the designated dump site and drops water into the drop tank/drafting pit.
- Drops additional equipment as required by the Water Supply Director.
- Becomes part of the shuttle operation.

Second Truck

- Position truck as close to the fire scene as possible for access by crew and equipment.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
- Consideration should be given to use of adjacent driveways.

First EMS Unit (If Suppression Trained)

- Follows direction of IC.
- If this unit is from a tanker station the crew can be used to augment the operation due to their familiarity with the system.
- If unit is used to assist in water supply operations and or firefighting an additional EMS unit needs to be called for immediately.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**

First Battalion Chief
- Takes over as the Incident Commander.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**

First EMS Supervisor/Command Aide - (If Suppression Trained)
- Assists battalion chief or IC as needed.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**

Second Battalion Chief
- Takes over responsibility as the Water Supply Branch Director.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION**

Second EMS Supervisor/Command Aide - (If Suppression Trained)
- Assists battalion chief with Water Supply Branch Operations.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION**

Third Battalion Chief
- Report to fire scene for assignment.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION**

Combination Operations

There are multiple combination operations that can be set up; this manual will only cover a few. Unit assignments are given in the appendixes of this manual to cover the operations shown. Unique water supply operations will dictate the use of equipment and personnel. Listed below are tasks assigned to units on every incident.

First-Engine Company
- Upon dispatch of a working fire in a structure in a non-hydrant area, a Tanker Task Force should be added at the discretion of the initial engine company or the battalion chief.
- Lay out supply line from incident preplan.
- Have the fifth-due engine company respond to a designated fill site.
- Advise incoming units of the mode of attack and supply line position according to the pre-plan.

Second Engine
- Officer on the second-due engine typically assumes command of the incident if it is transferred from the first engine.
- Driver performs water supply duties assigned per the preplan.
- Officer and crew to report to fire scene.

Third Engine

- Third engine officer assumes position as Dump Site Division Supervisor.
- The DSDS will head up water supply operations until the second Battalion Chief establishes the Water Supply Branch. Once the Water Supply Branch is established, the DSDS will only be responsible for dump site operations.
- Crew is used to facilitate water supply, the following are a few tasks that may need to be accomplished - set up the dump site, stretch supply lines, attach appliances to lines, connect and disconnect lines for shuttling pumpers, set up portable pumps.

Fourth Engine

- Crew with officer proceeds to the incident site to become RIT.
- Driver to stay with engine to shuttle or pump during relay operations.

Fifth Engine

- The fifth–due engine dispatched on the incident will most likely be directed to respond to the fill site location with the crew to begin fill-site operations.
- At least two lines will come from the engine to facilitate the rapid filling of units coming to the fill site. (Tankers have priority and should have a designated fill position.)
- The officer will become the fill-site division supervisor and will be under the direction of the Water Supply Branch Director.
- In relay operations, officer and crew will be given an assignment.

Sixth Engine

- Officer and crew will be given an assignment.

Tankers

- In a shuttle operation, if dump site is not established:
  - Tankers are to stop at dump-site location.
  - Hooks line up to siamese or wye and begins to supply water.
  - Assists third-due engine company crew with establishing dump site by dropping additional drafting pits and equipment.
  - When water drop is completed these units becomes part of the shuttle operation.

- In a shuttle operation, if dump site is established:
  - Tankers may need to drop additional equipment at the dump site or fill site as needed.
  - Tankers will shuttle.

- If in a relay operation:
  - Tankers will supplement the water supply until relay is operational.
  - Tankers may continue to be used to supplement the relay operation with a shuttle operation.

First Truck
- Positions truck as close to the fire scene as possible for access by crew and equipment.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
- Consideration should be given to adjacent driveways.

Second Truck
- Positions truck as close to the fire scene as possible for access by crew and equipment.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
- Consideration should be given to adjacent driveways.

First Rescue
- Positions as close to the incident scene as possible for access by crew and equipment.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
- Consideration should be given to use of adjacent driveways.

First EMS Unit (If Suppression Trained)
- Follows direction of IC.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**
- If this unit is from a tanker station the crew can be used to augment the operation due to their familiarity with the system.
- If unit is used to assist in water supply operations and or firefighting an additional EMS unit needs to be called for.

First Battalion Chief
- Takes over as the IC.

First EMS Supervisor/Command Aide - (If Suppression Trained)
- Assists battalion chief or IC as needed.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**

Second Battalion Chief
- Takes over responsibility as the Water Supply Branch Director.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**

Second EMS Supervisor/Command Aide - (If Suppression Trained)
- Assists battalion chief with Water Supply Branch Operations.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION.**

Third Battalion Chief
- Report to fire scene for assignment.
- **UNIT MUST NOT BLOCK TRAVEL LANES FOR SHUTTLE OPERATION**

Rural Water Supply Relay Operations

With proper preplanning, relay operations with 4" hose are feasible at distances over one mile. It is recommended a water shuttle supplement the relay as it is being set up due to the time parameters of laying large amounts of hose. The low friction loss makes long relays a viable option.

Relay operations need to be preplanned and the preplan needs to be followed.

The rural water supply relay operation is a time consuming operation and a Tanker Task Force needs to be dispatched to these incidents to ensure an adequate supply of engine companies to complete the hose lay.

Additional tankers and engines that are not needed to accomplish the relay can supply their water to the fireground through a designated relay engine. The Water Supply Branch Director shall designate which engine is to accept the water from the supplementing units. The third-arriving engine company officer shall assume the role of the Water Supply Branch Director until relieved by the second Battalion Chief.

Nurse Tanker Operations

This operation is used on small fires where by the first engine and tanker's water will extinguish the fire, there is no sustained water supply in a nurse tanker operation. The first engine positions for fire attack and the tanker positions near engine and supplies water.

This should not be used for interior fire fighting operation!

Fire Boat Operations

Fire Boats can be used as a drafting unit to supply a relay, supplement an established water supply or supply a fill site for a shuttle operation.

Command should consider setting up a land based water supply operation by calling for a Tanker Task Force due to the limited number of fire boats and the possibility of extended response time. An engine company needs to be assigned to the fire boat's location to assist with the setup.

NON-DOMESTIC HYDRANT WATER SOURCES

Dry Hydrants

Dry hydrants are typically installed in ponds, lakes, or streams but could also be found attached to swimming pools. Dry hydrants installed properly will bring the water source to an accessible location. The water will not freeze in the winter due to the depth of dirt over the water level in the piping. Dry hydrants should be back flushed and tested by the local fire department every six months.

The dry hydrant is typically installed with a 4½" male steamer cap; fire department personnel must use a 4½" to 6" double female adapter to connect to hard sleeve.

Local fire departments must have a contingency plan in times of drought.

(The Commonwealth of Virginia has had grants to facilitate the installation of the dry hydrant. Please view the following web site for more information http://www.dof.virginia.gov/fire/dry-hydrants.shtml. More information about dry hydrants can be found in Appendix D.)

Storage Tanks

The developers of subdivisions normally install storage tanks. Upkeep is a concern; in some areas, it is not clear who is responsible for maintenance and upkeep of the tanks.

Tanks are normally underground and set up for drafting operations. Tanks sizes can vary widely. Due to tank design, it is impossible to draft all water from the system.

Systems should be tested by the local fire department every six months.

Static Water Sources (Ponds, Lakes, Bays, Rivers, Streams, Pools)

Static water sources can include ponds, lakes, bays, rivers, streams, and pools. The success of using a static water source depends on the accessibility and the water depth.

Weather can hinder the use of static water sources; in drought conditions, the water levels can be too low. In extreme cold weather, ice must be cut. In flooding conditions, debris can clog strainers.

Swimming pools can be used as a static water source. Many pools depend upon water weight to support the construction of the pool or to keep the pool in the ground. Consider the risk vs. benefit before using pool water - especially from a neighbor's home.

TEN MOST COMMON MISTAKES MADE WHEN DRAFTING

1. Forgetting to put the pump in gear
2. Not opening the intake
3. Forgetting to throttle up to a minimum of 1200 RPM
4. Iintake drain or petcock left open
5. Not priming long enough
6. Opening discharge(s) too quickly
7. Not ensuring that all intake connections are tightened
8. Forgetting to put the transmission in the correct gear
9. Not understanding “false prime” when using a front intake
10. Leaving the tank-to-pump valve in the open position

APPENDIX A – DEFINITIONS

Attack Engine: The first-arriving engine on the scene of a working fire that deploys attack line(s).

Dump Site: The location for shuttle apparatus to dump their water. Typically, a portable tank and/or a supply pumper (dump-site engine) will be set up at this location.

Dump-Site Division: The officer in charge (OIC) from the third engine will be tasked as the Dump-Site Division (DSD) and will manage the water supply operations until the arrival of the second Battalion Chief. The DSD reports to the Water Supply Branch Director (WSBD) once established. The DSD is responsible for setting up and maintaining the operations at the dump site.

Fill Site: The location where shuttle apparatus fill their tanks for transport to the dump site. An engine at draft or at a hydrant will be at this location.

Fill-Site Division (FSD): The officer in charge (OIC) from the fifth engine supervises activities at the fill site. The FSD reports to the Water Supply Branch Director (WSBD) and is responsible for setting up and maintaining the operations at the fill site.

Non-Hydrant: Includes all known locations where hydrants are in excess of 2,000 feet from a given structure**.** The definition of a non-hydrant area should include areas where the infrastructure has failed and/or has limited-access highways where water supply operations may significantly affect the handling of the incident.

Nurse Tanker: A tanker that proceeds with the initial attack engine to the incident scene and provides water as needed for the initial attack. This is used in a combination operation scenario where the initial layout of hose would be over 1,000 feet.

Relay Operations: The process utilizing two or more engines to supply the attack engine(s) directly from the water source through a supply line.

Shuttle Operations: A process utilizing engines and tankers to move water from a specified source to the incident scene.

Shuttle Route: The most efficient route possible for shuttle apparatus to utilize in transporting water from the fill site to the dump site.

Tanker: Apparatus designed to carry water from a fill site to the incident scene. The NOVA recommendation for a tanker is a minimum 1000 gpm pump and carries 2,000 gallons of water.

Tanker Task Force: Three tankers, two engines, and a battalion chief.

Water Supply Branch: is established by the Incident Commander and given the primary responsibility of supplying water to the incident scene in the needed gpm to meet the needs of the incident. It is recommended the second Battalion Chief be assigned as the Water Supply Branch Director.

Water Supply Branch Director (WSBD): It is recommended the second Battalion Chief be tasked with WSBD. The WSBD is assigned the role of developing an adequate water supply for the incident. The WSBD will need to secure their own radio channel for water supply operations. The third due Engine OIC will be responsible for the duties of the Water Supply Branch from the Dump Site Division position until relieved by the WSBD.

APPENDIX B – WATER USAGE AGREEMENT

WATER USAGE AGREEMENT

I/We, the undersigned owner(s) of a lake, pond, creek or other fixed body of water located at _____ do hereby grant the Fire Departments permission to utilize the body of water for emergency incident mitigation.

All other uses of said body of water shall be after notification and permission of the owner(s).

This contract can be cancelled at any time by written notice given thirty days in advance to the Fire Department.

_____ ___/___/___

OWNER **DATE**

_____ __/___/___

OWNER **DATE**

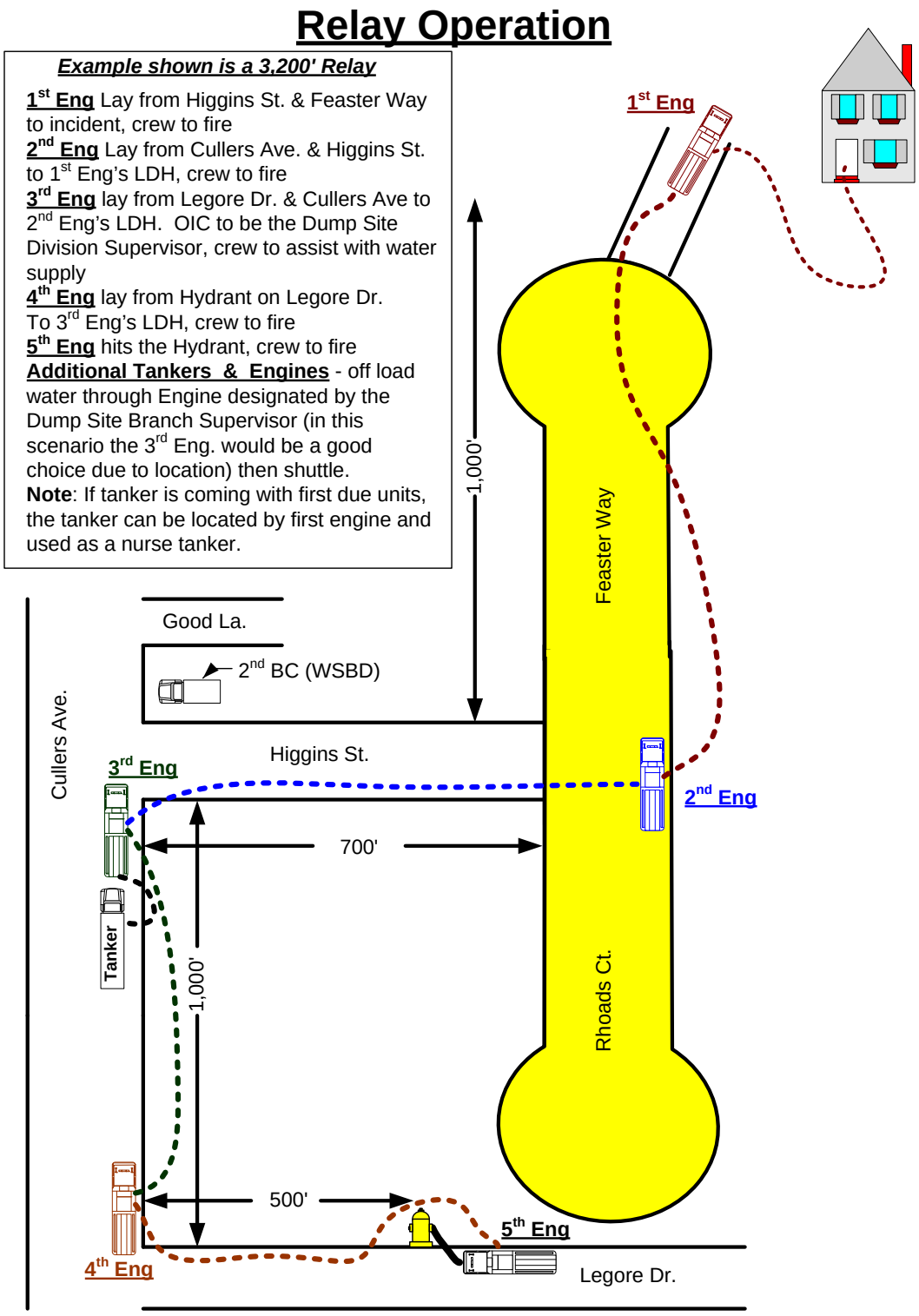
_____ __/___/___

WITNESS **DATE**

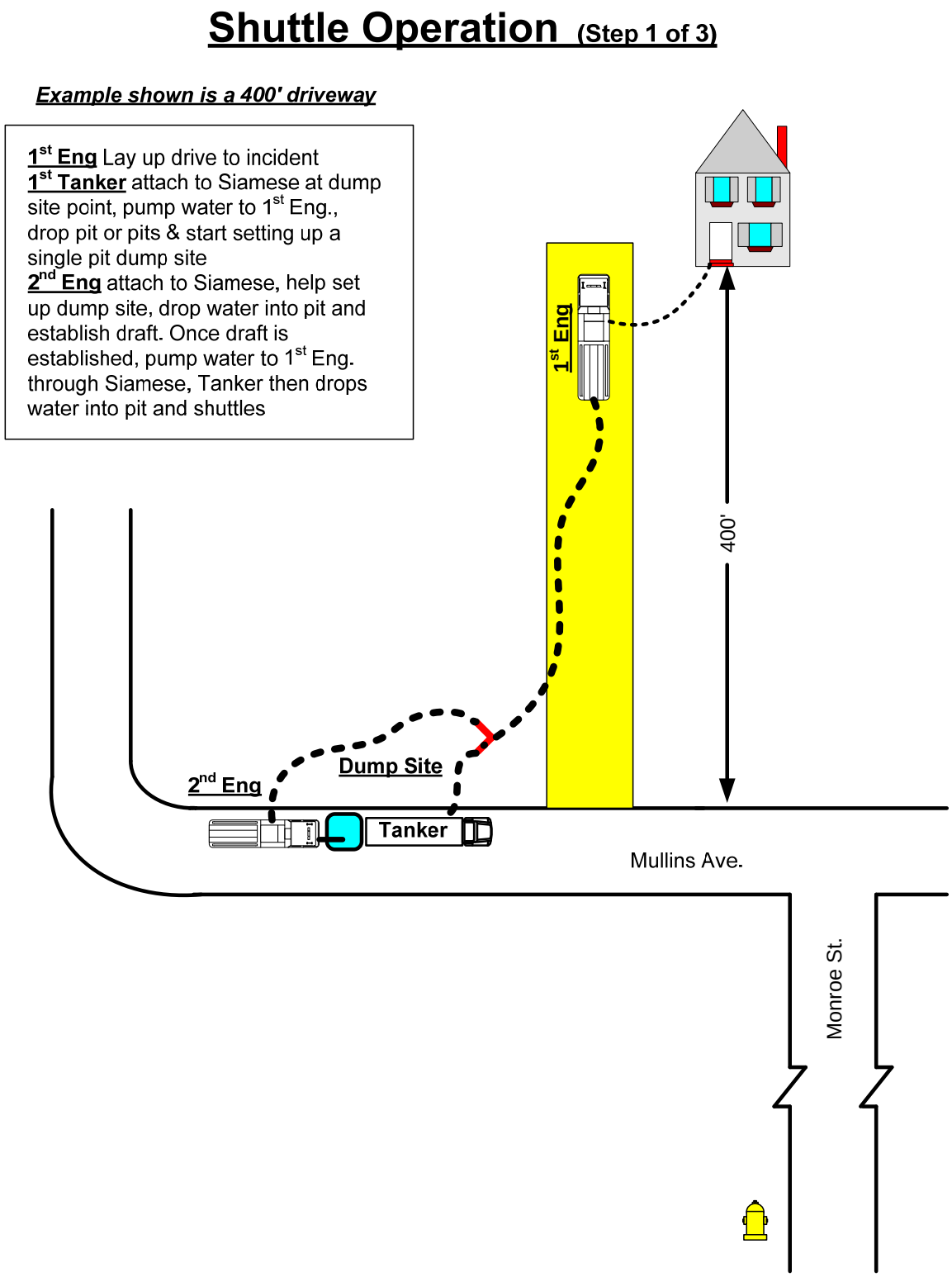
APPENDIX C – WATER SUPPLY GRAPHICS

This section contains some graphic representations of certain water supply incidents.

Relay Operations



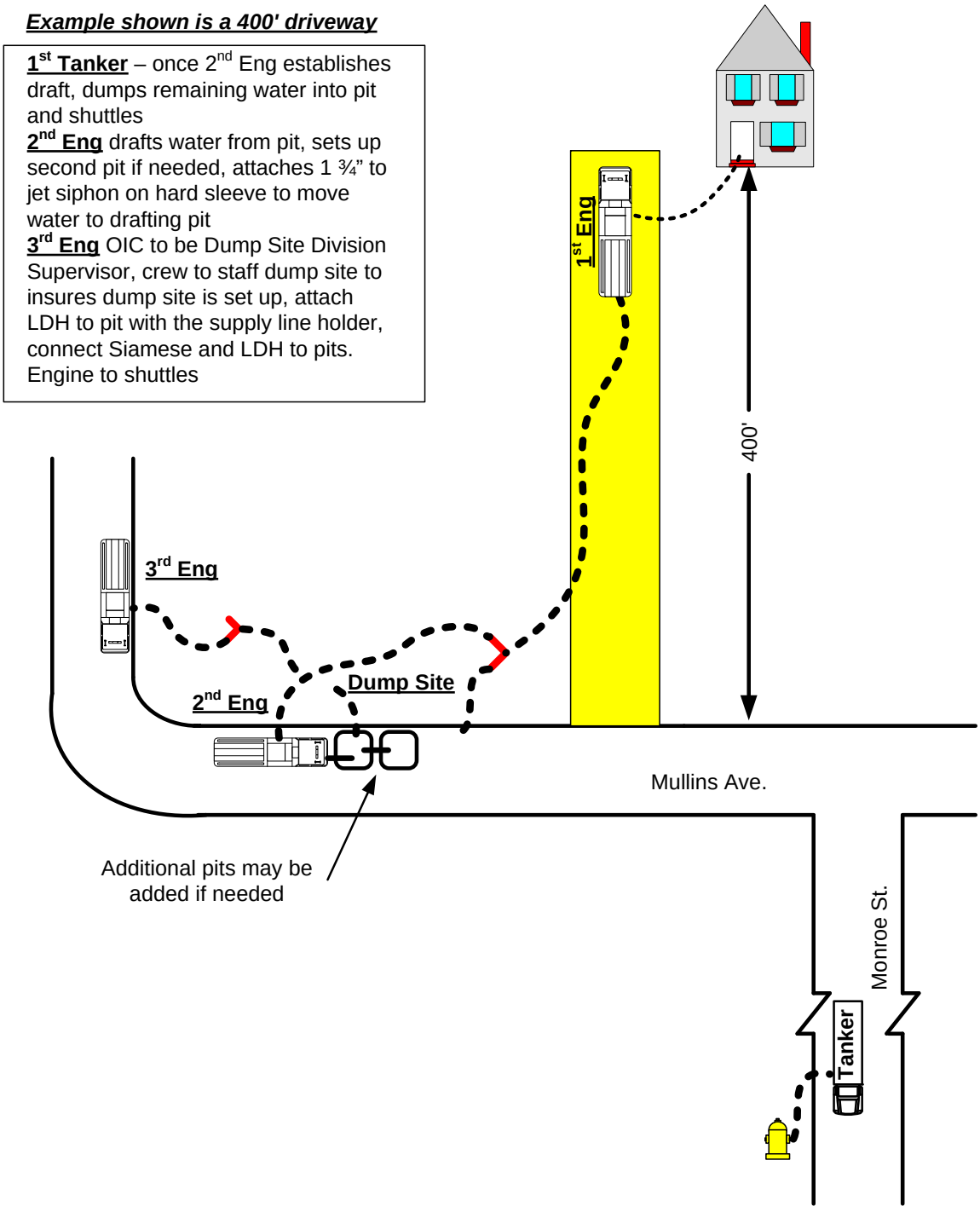
Shuttle Operation "Short Driveway" (Steps 1 through 3)



Shuttle Operation (Step 2 of 3)

Example shown is a 400' driveway

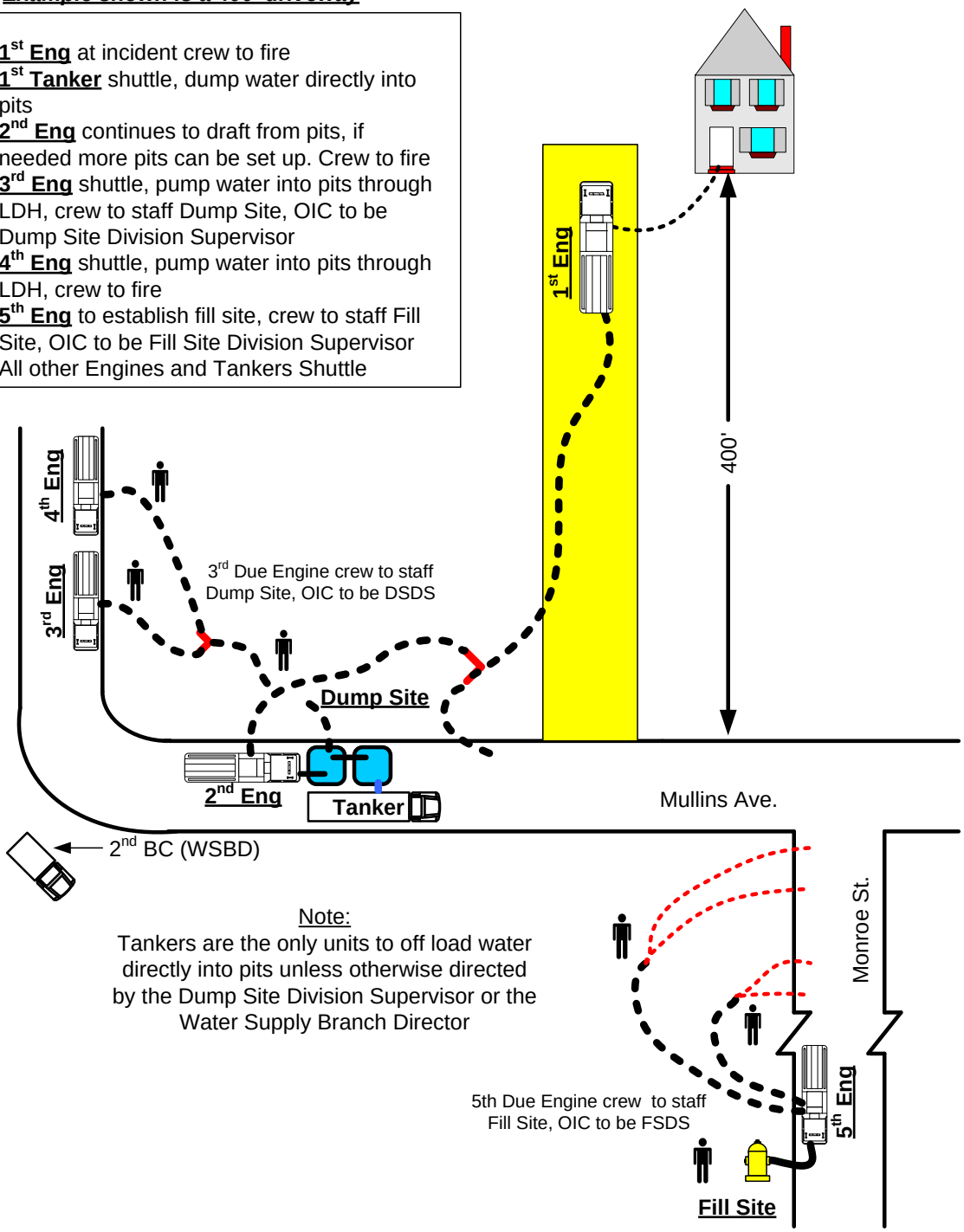
1st Tanker – once 2nd Eng establishes draft, dumps remaining water into pit and shuttles
2nd Eng drafts water from pit, sets up second pit if needed, attaches 1 ¾" to jet siphon on hard sleeve to move water to drafting pit
3rd Eng OIC to be Dump Site Division Supervisor, crew to staff dump site to insures dump site is set up, attach LDH to pit with the supply line holder, connect Siamese and LDH to pits. Engine to shuttles



Shuttle Operation (Step 3 of 3)

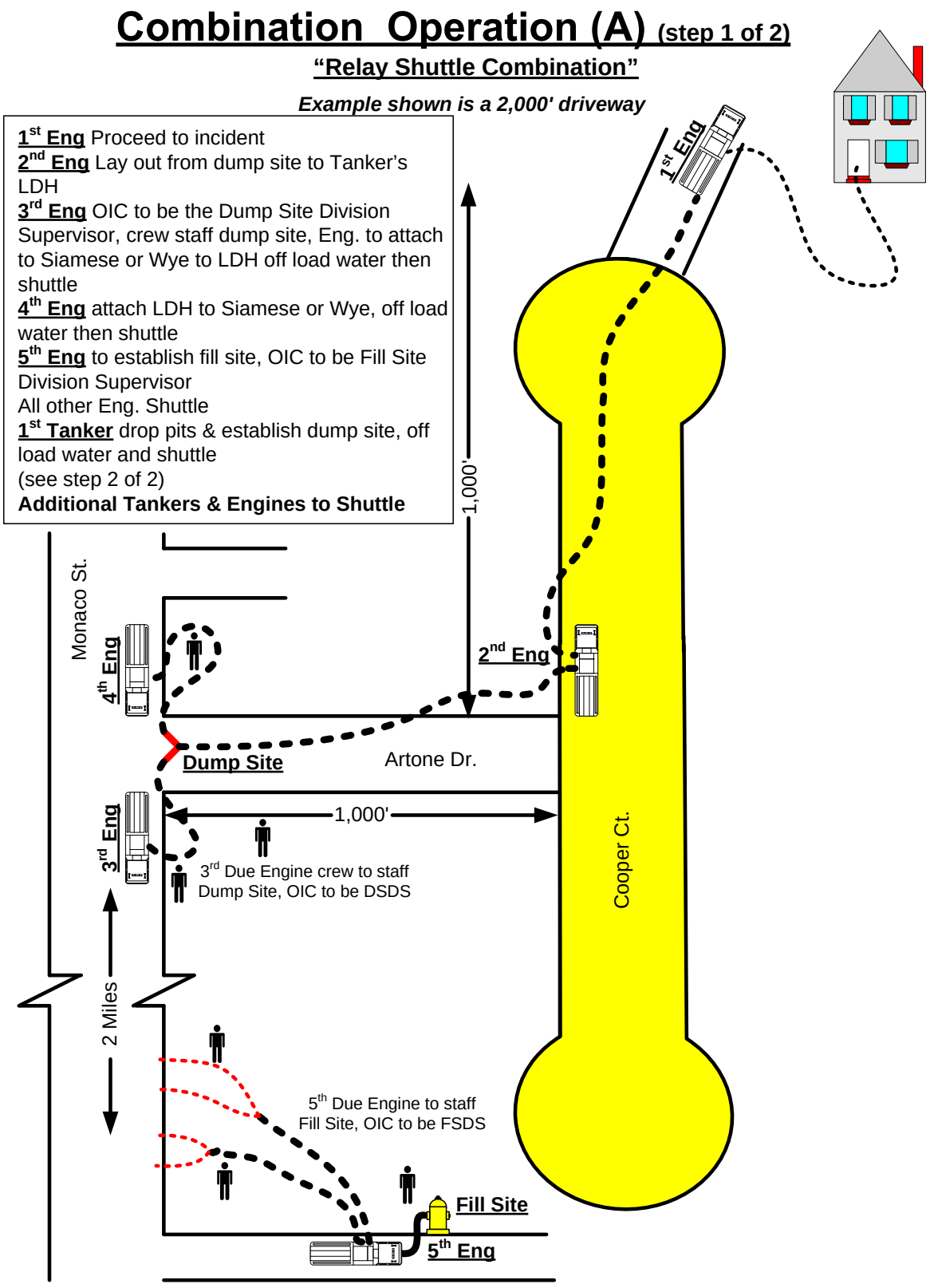
Example shown is a 400' driveway

1st Eng at incident crew to fire
1st Tanker shuttle, dump water directly into pits
2nd Eng continues to draft from pits, if needed more pits can be set up. Crew to fire
3rd Eng shuttle, pump water into pits through LDH, crew to staff Dump Site, OIC to be Dump Site Division Supervisor
4th Eng shuttle, pump water into pits through LDH, crew to fire
5th Eng to establish fill site, crew to staff Fill Site, OIC to be Fill Site Division Supervisor
All other Engines and Tankers Shuttle



Note:
Tankers are the only units to off load water directly into pits unless otherwise directed by the Dump Site Division Supervisor or the Water Supply Branch Director

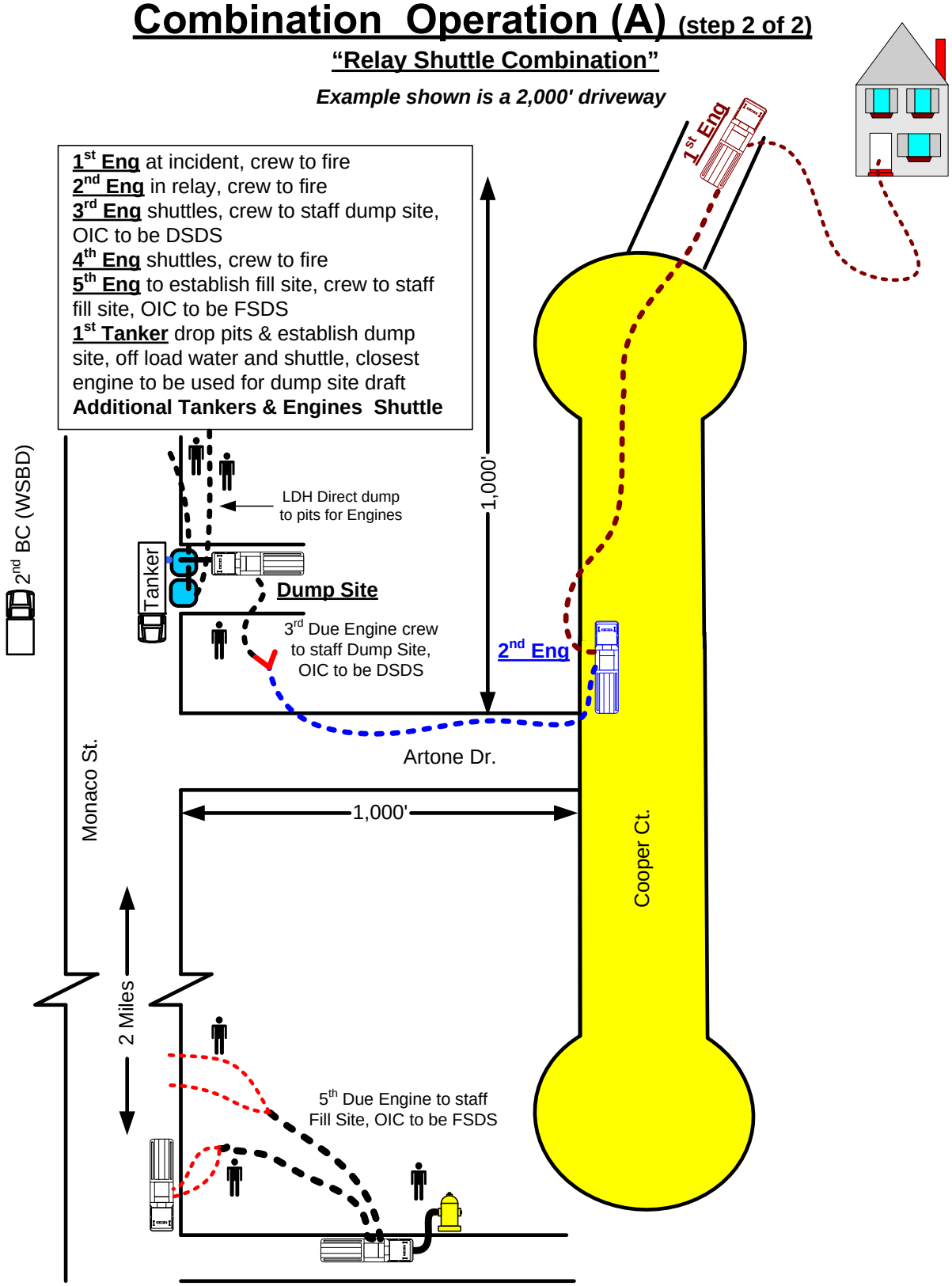
Combination Operations



Combination Operation (A) (step 2 of 2)

"Relay Shuttle Combination"

Example shown is a 2,000' driveway

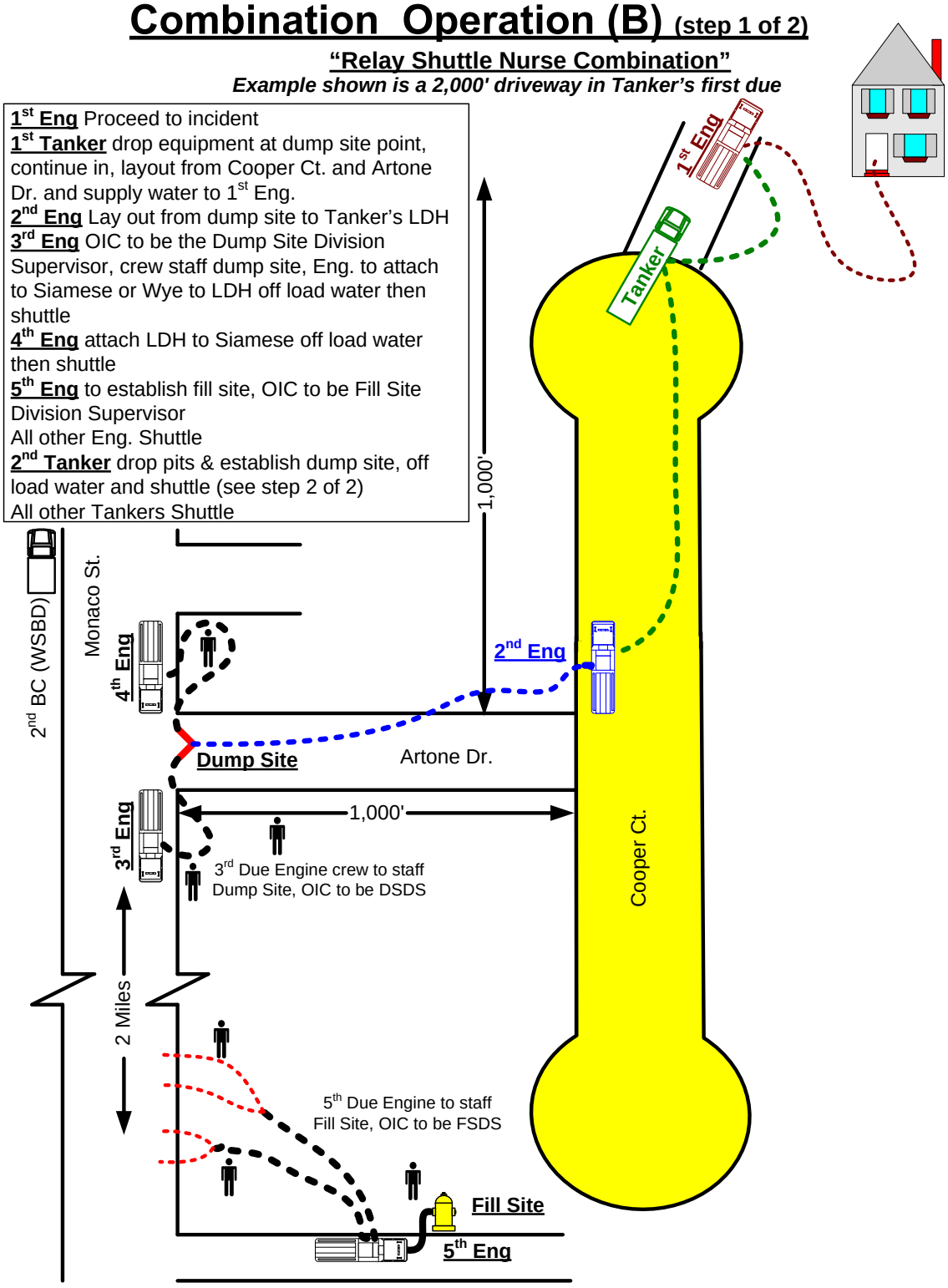


Combination Operation (B) (step 1 of 2)

"Relay Shuttle Nurse Combination"

Example shown is a 2,000' driveway in Tanker's first due

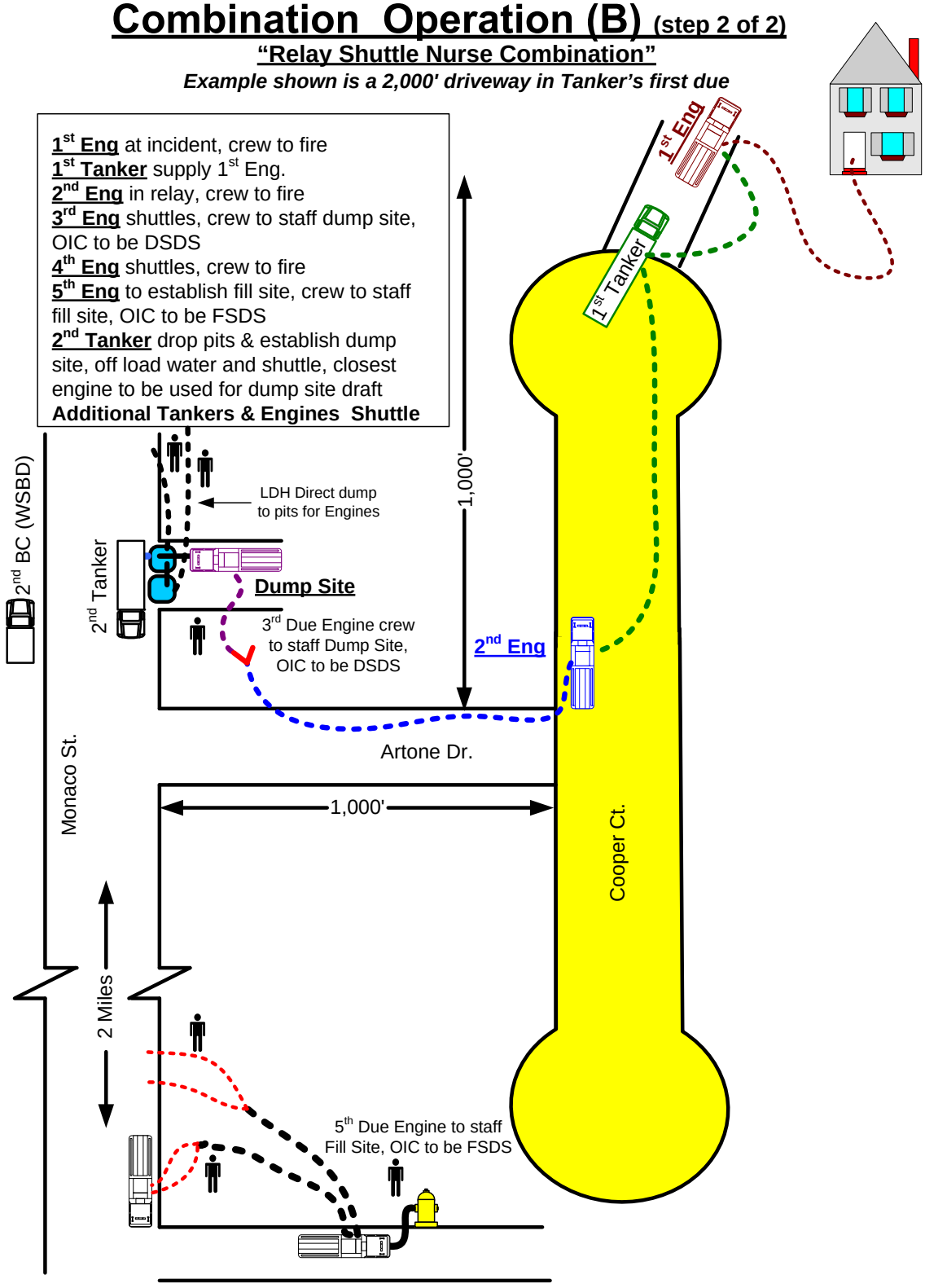
1st Eng Proceed to incident
1st Tanker drop equipment at dump site point, continue in, layout from Cooper Ct. and Artone Dr. and supply water to 1st Eng.
2nd Eng Lay out from dump site to Tanker's LDH
3rd Eng OIC to be the Dump Site Division Supervisor, crew staff dump site, Eng. to attach to Siamese or Wye to LDH off load water then shuttle
4th Eng attach LDH to Siamese off load water then shuttle
5th Eng to establish fill site, OIC to be Fill Site Division Supervisor
All other Eng. Shuttle
2nd Tanker drop pits & establish dump site, off load water and shuttle (see step 2 of 2)
All other Tankers Shuttle



Combination Operation (B) (step 2 of 2)

"Relay Shuttle Nurse Combination"

Example shown is a 2,000' driveway in Tanker's first due

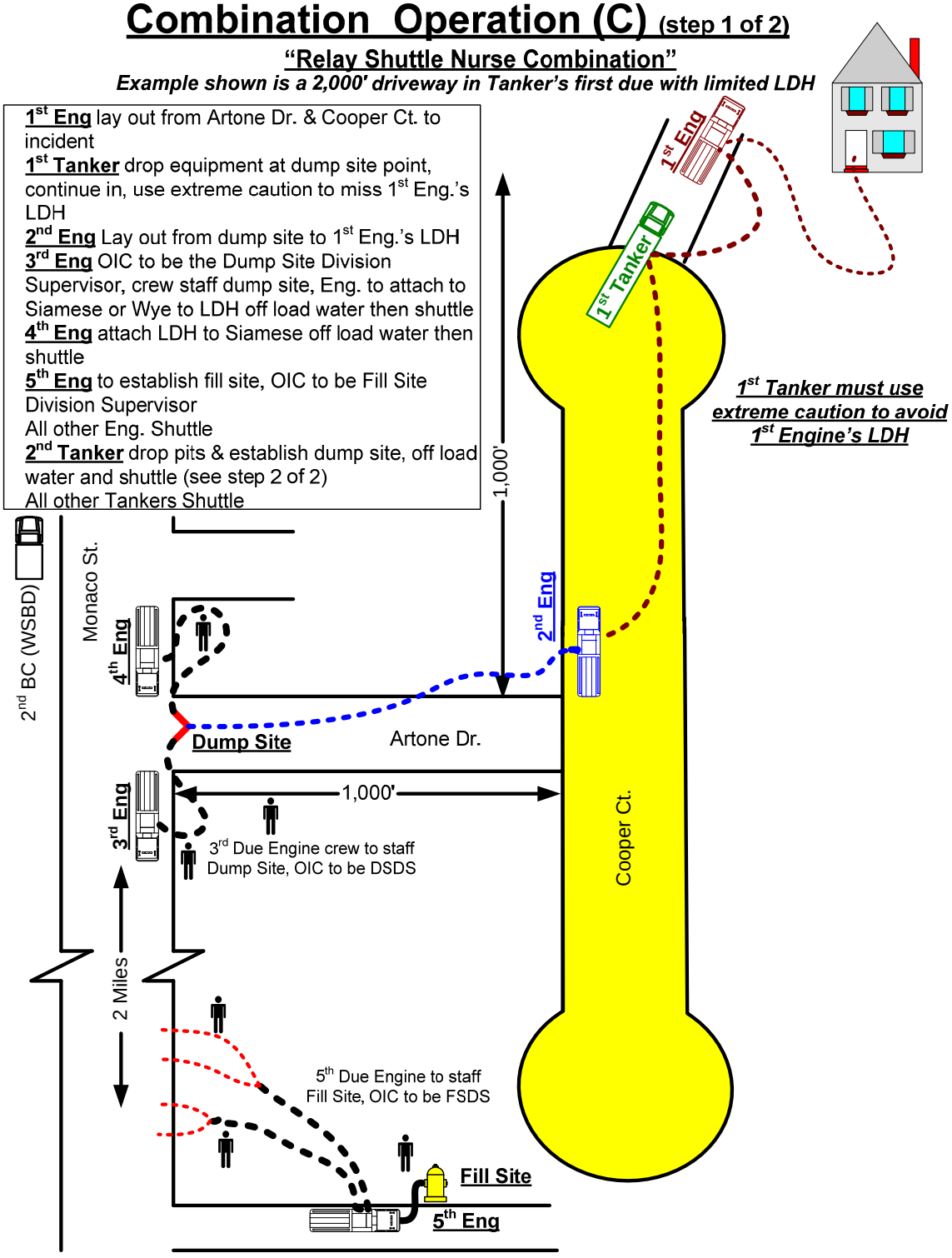


Combination Operation (C) (step 1 of 2)

"Relay Shuttle Nurse Combination"

Example shown is a 2,000' driveway in Tanker's first due with limited LDH

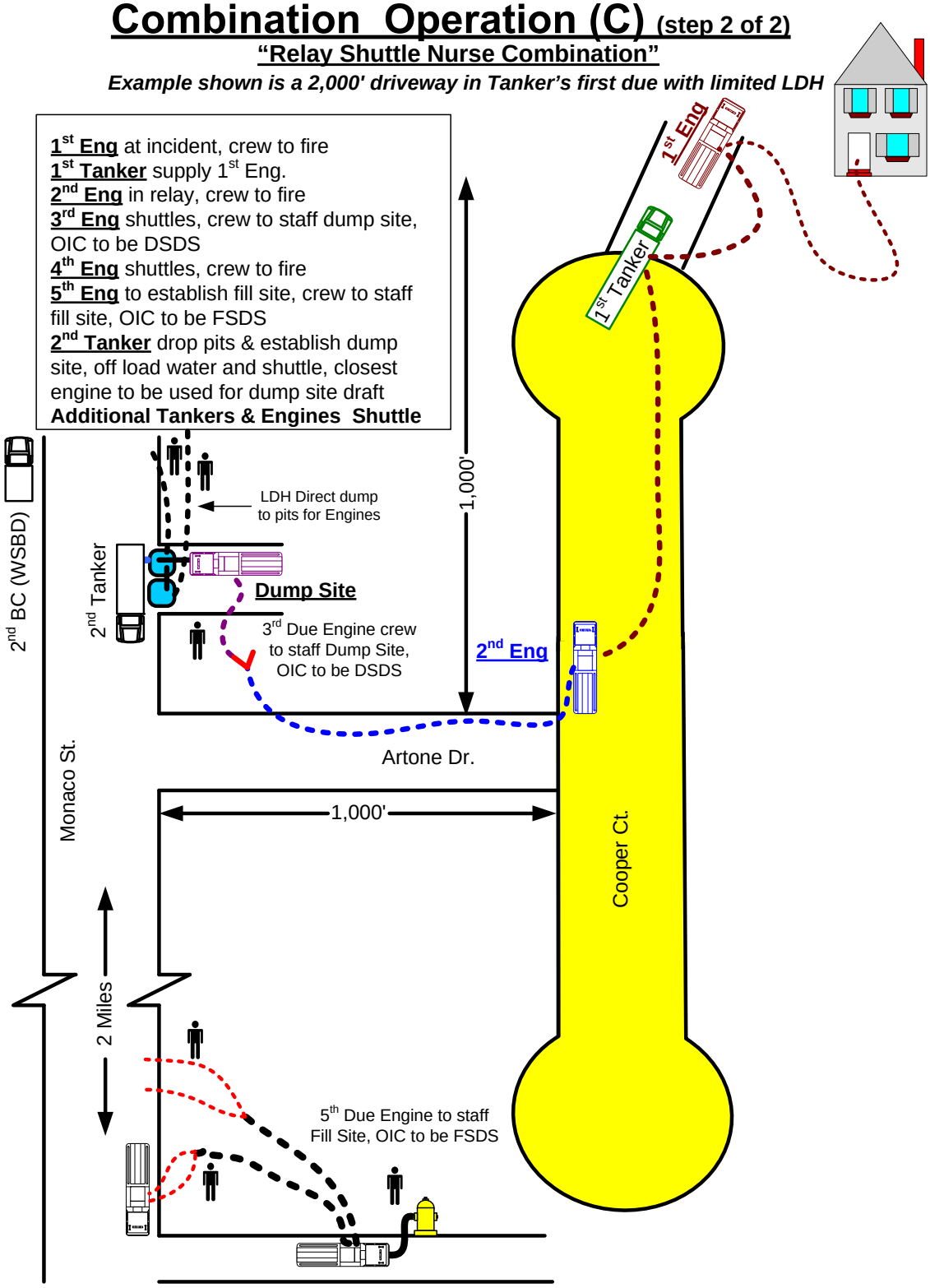
1st Eng lay out from Artone Dr. & Cooper Ct. to incident
1st Tanker drop equipment at dump site point, continue in, use extreme caution to miss 1st Eng.'s LDH
2nd Eng Lay out from dump site to 1st Eng.'s LDH
3rd Eng OIC to be the Dump Site Division Supervisor, crew staff dump site, Eng. to attach to Siamese or Wye to LDH off load water then shuttle
4th Eng attach LDH to Siamese off load water then shuttle
5th Eng to establish fill site, OIC to be Fill Site Division Supervisor
All other Eng. Shuttle
2nd Tanker drop pits & establish dump site, off load water and shuttle (see step 2 of 2)
All other Tankers Shuttle



Combination Operation (C) (step 2 of 2)

"Relay Shuttle Nurse Combination"

Example shown is a 2,000' driveway in Tanker's first due with limited LDH

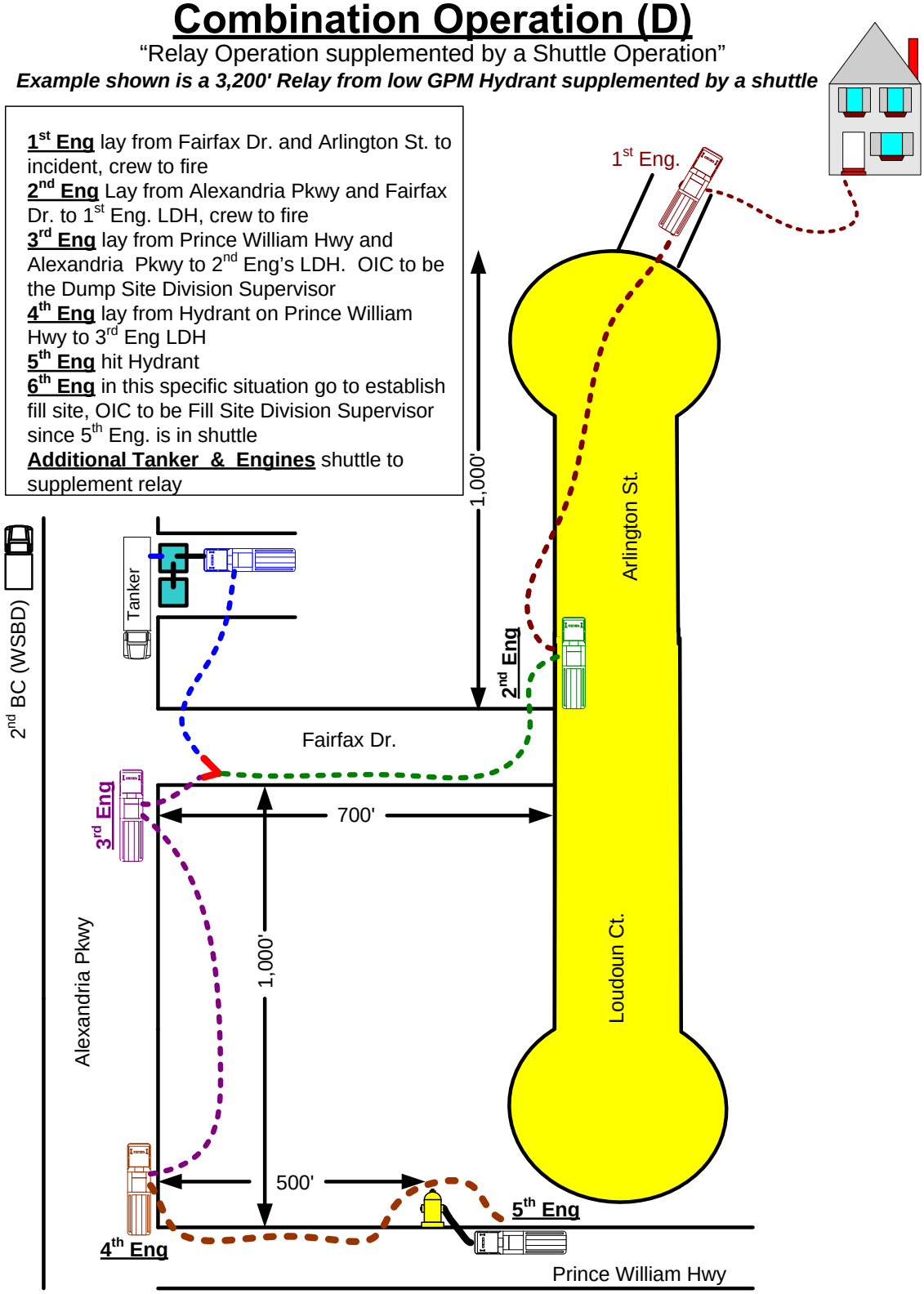


Combination Operation (D)

"Relay Operation supplemented by a Shuttle Operation"

Example shown is a 3,200' Relay from low GPM Hydrant supplemented by a shuttle

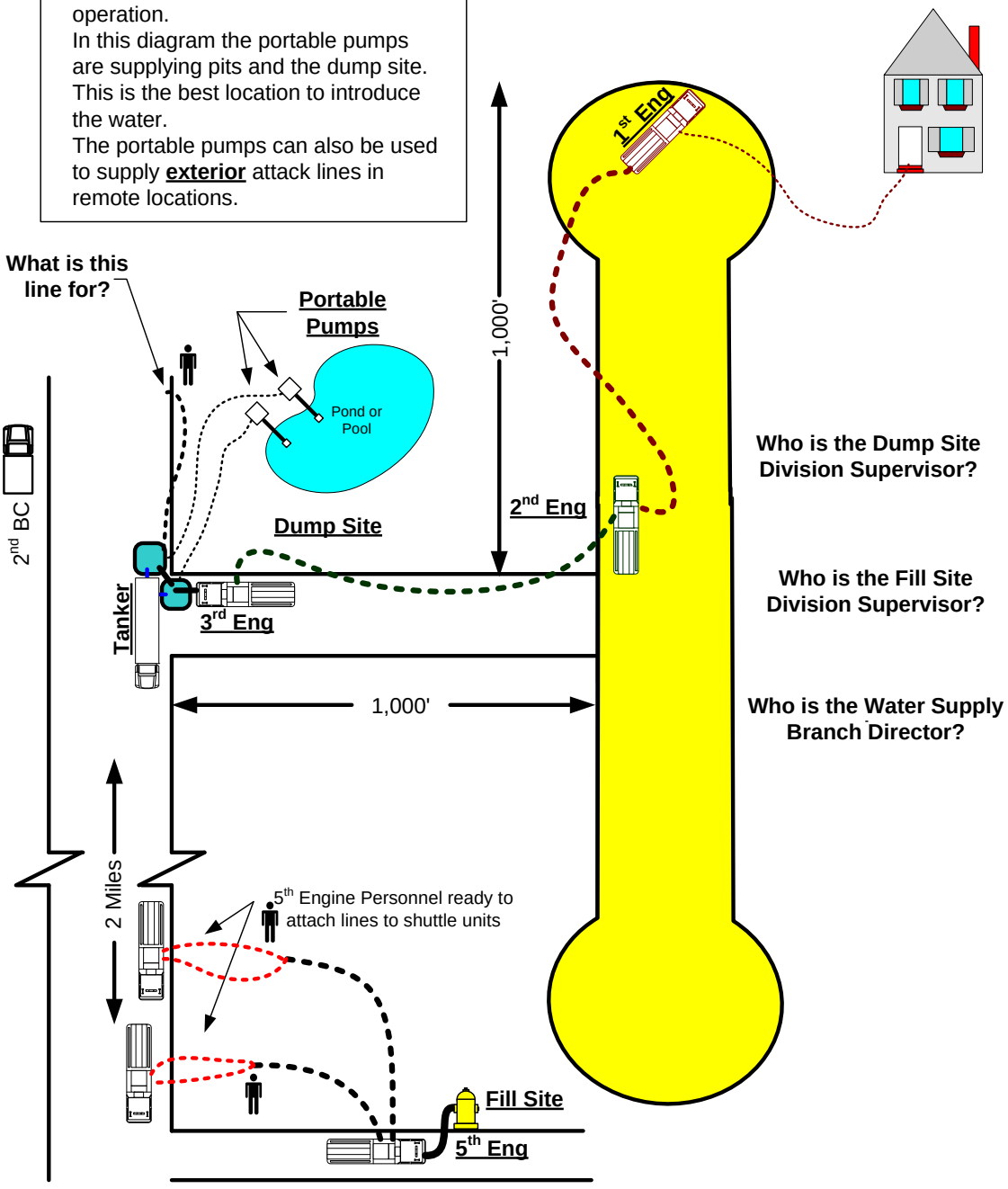
1st Eng lay from Fairfax Dr. and Arlington St. to incident, crew to fire
2nd Eng Lay from Alexandria Pkwy and Fairfax Dr. to 1st Eng. LDH, crew to fire
3rd Eng lay from Prince William Hwy and Alexandria Pkwy to 2nd Eng's LDH. OIC to be the Dump Site Division Supervisor
4th Eng lay from Hydrant on Prince William Hwy to 3rd Eng LDH
5th Eng hit Hydrant
6th Eng in this specific situation go to establish fill site, OIC to be Fill Site Division Supervisor since 5th Eng. is in shuttle
Additional Tanker & Engines shuttle to supplement relay



Combination Operation (E)

"Shuttle Operation supplemented by Portable Pumps"

Portable pumps can be utilized to supplement any rural water supply operation.
In this diagram the portable pumps are supplying pits and the dump site. This is the best location to introduce the water.
The portable pumps can also be used to supply **exterior** attack lines in remote locations.



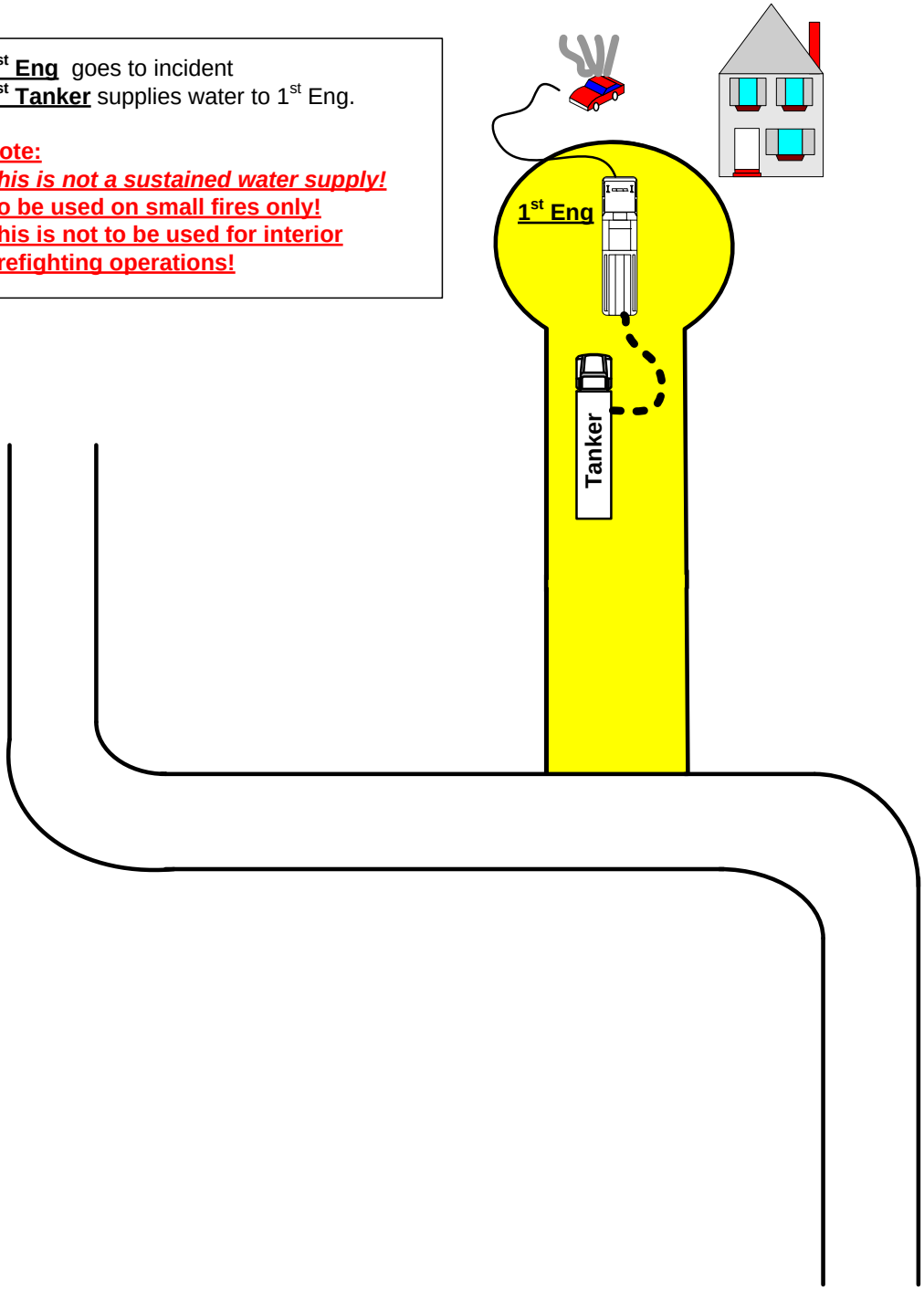
Nurse Tanker Operation

Nurse Tanker Operation

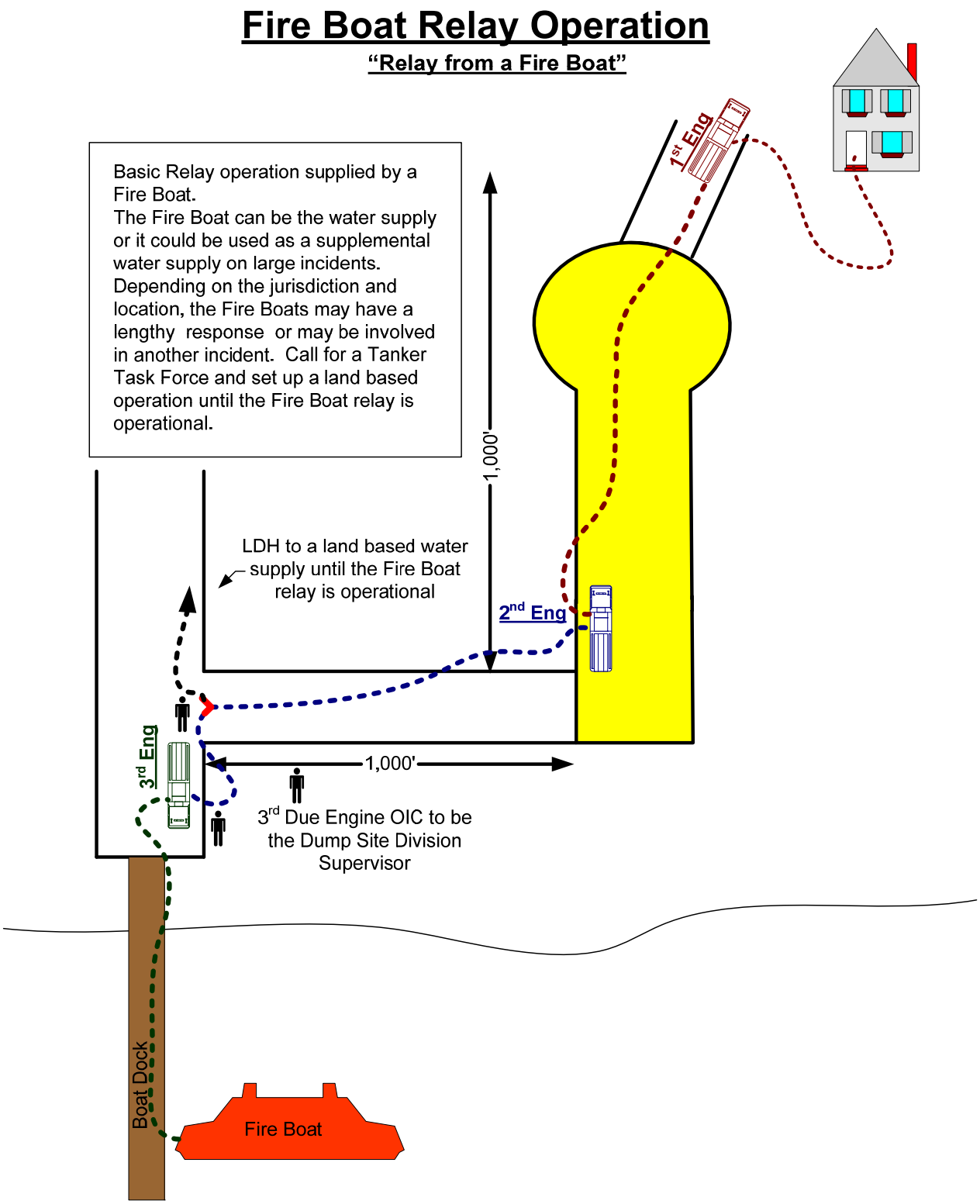
Example shown is a auto fire

1st Eng goes to incident
1st Tanker supplies water to 1st Eng.

Note:
This is not a sustained water supply!
To be used on small fires only!
This is not to be used for interior firefighting operations!



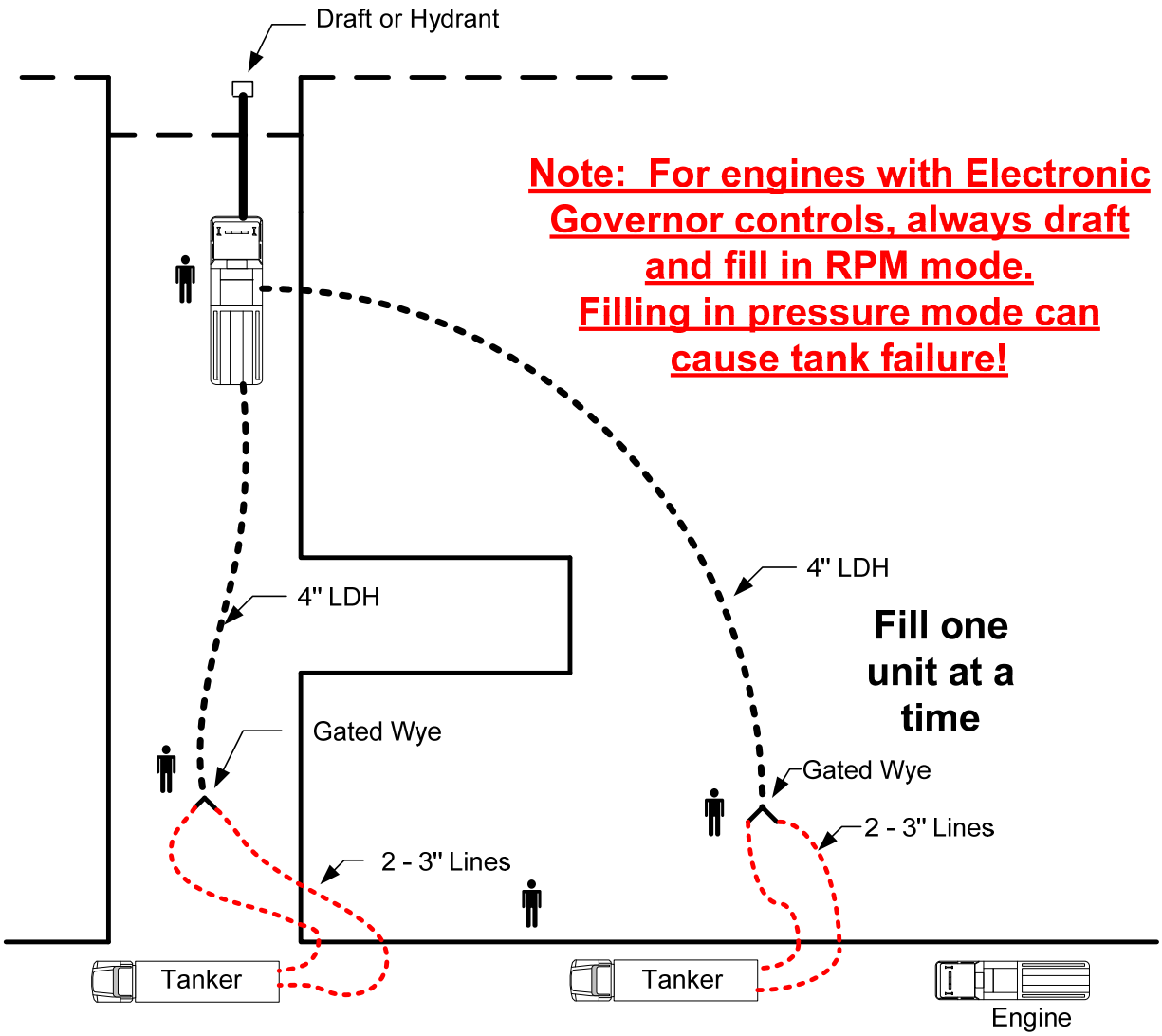
Fire Boat Operation



Fill Site Operations

Fill Site Operations

Normally handled by the 5th Engine
OIC to be Fill Site Division Supervisor
Personnel must be ready to hook and unhook lines
Driver does not need to shut lines down if Wye is utilized
This could be set from a hydrant or from draft



Tankers have priority over Engines

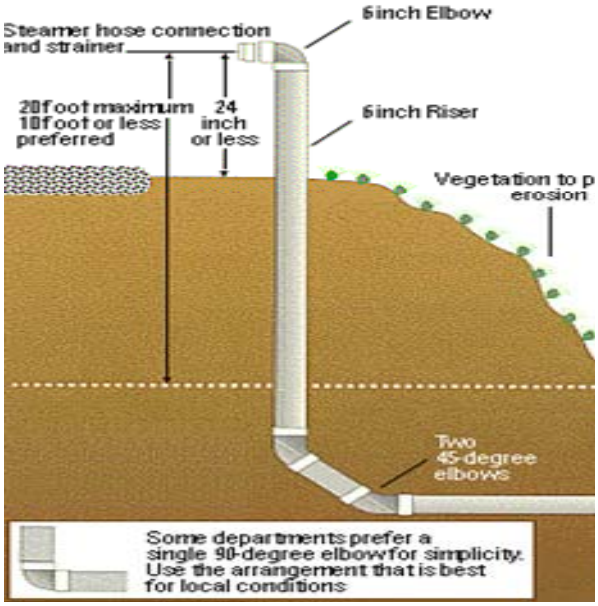
APPENDIX D – DRY HYDRANTS AND STORAGE TANKS

Typical Dry Hydrant

Note:

Back flush system prior to use.

A 4 ½" to 6" Double female adapter is needed to connect the hard sleeve to the hydrant at most sites.

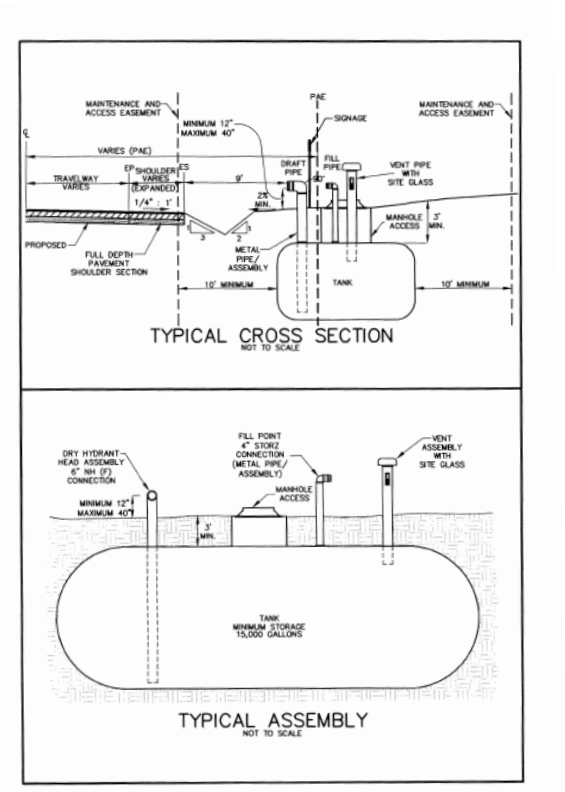


A. Water Storage Tank

Typical Water Storage Tank

Note:

Tank sizes vary.
This is not a sustainable water supply.
Systems must be refilled after use.



APPENDIX E – NOVA QUICK REFERENCE SHEET

Unit	Shuttle Operation	Nurse Operations	Combination Operations	Relay Operations
1st Engine	Lay supply line from dump site to the incident, (split lay may be necessary). Advise incoming units of the mode of attack, supply line positioning, dump & fill site locations. Command Decision.	Respond to incident location, Supply line positioning, On-scene report, size-up, command decision. Consider requesting additional resources. *Note: Not to be used for interior firefighting–Small Fires Only*	Announce water supply instructions to incoming units. On-scene report, size-up, command decision. Consider requesting additional resources.	Lay supply line from location <1000' from incident. Advise incoming units of the mode of attack & supply line drop preplanned positions. Command Decision.
2nd Engines	Supply water to the 1st Engine via the Siamese. Establish dump site. Engine prepares to draft from pit. Officer & crew report to the fireground. Assume Command if needed.	Resource not dispatched for this operation.	Complete split lay for relay operations or establish the Dump Site. Supply water to the 1st Engine. Officer & crew report to the fireground. Assume Command if not established.	**All Engines**- Lay supply line from preplanned points to 1st Engine's supply line until at water source. **2nd Eng.** - Officer & crew report to the fireground. Assume Command as needed.
3rd Engine	Officer & crew set up & staff the dump site. Officer establishes the Dump Site Division . Engine driver pumps or dumps water at the dump site & enters the shuttle operation.	Resource not dispatched for this operation.	Officer establishes the Dump Site Division Supervisor. Crew performs water supply operations as directed. Operations may include: establish dump site, set-up portable pumps, hand -lay additional supply lines etc.	Officer establishes the Dump Site Division & directs the off loading of supplemental shuttling units and coordinates water supply. Crew to assist with water supply as needed.
4th Engine	Officer & crew establish RIT. Engine Driver pumps or dumps water at the dump site & enters the shuttle operation.	Resource not dispatched for this operation.	Officer & crew establish RIT. Engine Driver shuttles or pumps as part of a relay depending on the operation being used.	Officer & crew establish RIT. Engine Driver pumps in relay, supplemental shuttle, drafts or hits hydrant as needed
5th Engine	Establish & staff the fill site at the designated location. OIC will become the "Fill Site Division Supervisor"	Resource not dispatched for this operation.	Shuttle Ops: Establish & staff the fill site. OIC will become the "Fill Site Division Supervisor".	Officer & crew to assist as needed. Engine Driver pumps in relay, supplemental shuttle, drafts or hits hydrant as needed
6th Engine	Officer & crew assigned as directed by the IC. Driver and apparatus join the shuttle operation	Resource not dispatched for this operation.	Assignments will be determined based on the specific operation being used and assigned by the IC or Water Supply Branch.	Officer & crew assigned as directed by the IC.
1st, 2ndTruck & 1st Rescue	Position as close as possible for crew and equipment access. APPARATUS MUST NOT BLOCK THE TRAVEL LANES USED BY SHUTTLE APPARATUS. Consider the use of adjacent driveways.	Position as close as possible for crew and equipment access. APPARATUS MUST NOT BLOCK THE TRAVEL LANES. Consider the use of adjacent driveways.	Position as close as possible for crew and equipment access. APPARATUS MUST NOT BLOCK THE TRAVEL LANES USED BY SHUTTLE APPARATUS. Consider the use of adjacent driveways.	Position as close as possible for crew and equipment access. APPARATUS MUST NOT BLOCK THE TRAVEL LANES USED BY SHUTTLE APPARATUS. Consider the use of adjacent driveways.

1st Tanker	Supply the 1st engine via the Siamese. Drop all equipment needed to establish the dump site. Once draft is established from pit by 3rd Engine, dump any remaining water into pit and begin the shuttle.	Supply the 1st Engine.	Supply the 1st engine via a Siamese. Drop all equipment needed to establish the dump site. Once the dump site is established dump any remaining water into tank and begin the shuttle.	Supply the 1st engine via the Siamese or relay engine. If not locked in the relay, tanker will supplemental shuttle until continuous water source is established.
2nd Tanker	Report to Dump Site, Dump water, & Enter the shuttle operation	Resource not dispatched for this operation.	Same as 1st Tanker	Report to Dump Site Division Supervisor, Dump water, & supplemental shuttle.
3rd Tanker	Report to Dump Site, Dump water, & Enter the shuttle operation	Resource not dispatched for this operation.	Same as 1st & 2nd Tanker	Report to Dump Site Division Supervisor, Dump water, & supplemental shuttle.
1st BC	Assume Incident Command	Assume Incident Command	Assume Incident Command	Assume Incident Command
2nd BC	Assumes responsibility as the Water Supply Branch Supervisor near Dump Site area.	Resource not dispatched for this operation.	Assumes responsibility as the Water Supply Branch Supervisor.	Assumes responsibility as the Water Supply Branch Supervisor.
3rd BC	Reports to the IC for assignment.	Resource not dispatched for this operation.	Reports to the IC for assignment.	Reports to the IC for assignment.
1st EMS unit	PPE, Establish Rehab, May be assigned to augment the operation-Request additional EMS unit when assigned to firefighting or supply operations.	PPE, Establish Rehab, May be assigned to augment the operation-Request additional EMS unit when assigned to firefighting or supply operations.	PPE, Establish Rehab, May be assigned to augment the operation-Request additional EMS unit when assigned to firefighting or supply operations.	PPE, Establish Rehab, May be assigned to augment the operation-Request additional EMS unit when assigned to firefighting or supply operations.
1st EMS Supervisor	If suppression trained, assist the IC as needed.	Resource not dispatched for this operation.	If suppression trained, assist the IC as needed.	If suppression trained, assist the IC as needed.
2nd EMS Supervisor	If suppression trained, assist the 2nd BC with water supply operations.	Resource not dispatched for this operation.	If suppression trained, assist the 2nd BC with water supply operations.	If suppression trained, assist the 2nd BC with water supply operations.